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February 21, 2011
Project Number 070181

Waste Management
Richard T. Von Pein, P. E.
Director of Engineering, Western Group
6640 Amber Lane
Pleasanton, CA 94566

Subject: Work Plan for Sedimentation Basin Restoration- Waimanalo Gulch Sanitary Landfill, Ewa Beach, Oahu, HI

Dear Mr. Von Pein,

As requested, GEI Consultants (GEI) has prepared a work plan to restore the sediment basin system to its intended capacity and function after the occurrence of the recent storm events in December 2010 and January 2011.

Sedimentation Basin Features

The sedimentation basin was originally designed and constructed in the late 1980's. Recently (2006-2007), there were several modifications made to the basin including the placement of an interior pond retention berm, swale energy dissipation improvements, installation of a subdrain system, and replacement of the two 42-inch corrugated metal riser pipes with concrete risers. Attachment A includes a copy of the design drawings by Shimabukuro, Endo, and Yoshizaki, Inc. showing the original basin design, and EarthTech drawings showing the recent modifications. Attachment B includes photographs of the basin in October 2007 after construction of the basin modifications.

The sedimentation basin currently receives drainage that is collected in the western concrete-lined drainage channel immediately upstream of the basin. The sedimentation basin consists of the following elements, described in an upstream to downstream direction:

- **Sedimentation Basin Inlet Apron** - The inlet located at the downstream end of the western concrete lined drainage channel consists of a 30-foot long rock riprap apron. The rock riprap sizes are approximately 18 to 24 inches in diameter.

- **Northern Basin and Interior Berm Area** – A riprapped interior berm is located in the northern (upstream) portion of the basin. The interior berm is approximately 4 feet high. The northern basin area and interior berm function as a pre-holding area to reduce the amount of coarser sediment that will continue to travel downstream in the basin, and possibly reduce the hydraulic mixing and churning of the finer sediment in the southern basin. The approximate elevation of the basin floor in this area is El. 65. The basin side slopes adjacent to the floor are inclined at 2 horizontal to 1 vertical (H: V), and the total depth of the basin in this area is approximately 18 feet. There is also a riprapped energy dissipator at the northeast corner of the basin to reduce exit velocities from 18-inch and 42-inch storm water pipes exiting into the basin at this location.

- **Southern Basin Area** - The southern portion of the basin contains a subdrain system beneath the basin floor to lower and discharge the standing water in the basin during low flow events. The subdrain system and consists of 6-inch, perforated high density polyethylene (HPDE) pipes placed in an 18-inch wide by 24-inch deep infiltration trench wrapped in a filter cloth. The trench is backfilled with ½ to ¾-inch drain rock with an overlying 6-inch sand bedding layer at the base of the sedimentation basin. The HDPE pipes are connected directly to the CMP outlet pipes (described below) to allow for conveyance of drainage from the subdrain system.

  The basin side slopes adjacent to the floor are inclined at 2 horizontal to 1 vertical, and the total depth of the basin in this area is approximately 18 feet. However, the earthen embankment at the downstream end of the pond is approximately 4.5 to 5 feet lower, to form an emergency spillway crest for the sedimentation basin (see riprapped embankment and spillway description below).

- **Outlet Riser Pipes** - There are two reinforced 48-inch diameter concrete inlet riser pipes that function as principal outlets for the sedimentation basin. The riser pipes were constructed without intermediate orifice openings, so drainage of basin inflow will be through the overflow outlet at the top of the riser or through the underlying subdrain system described previously. The vertical riser pipes outlets connect via a concrete box to 42-inch diameter horizontal corrugated metal pipes (CMP's) located at the base of the embankment at the downstream end of the sedimentation basin. The CMP's outlet on the spillway apron at the downstream toe of the embankment.

- **Riprapped Embankment and Spillway** - An earthfill embankment was constructed at the south end of the basin to provide containment on the downstream side of the pond. The embankment is armored with a 2' thick layer of grouted riprap. The crest and downstream slope of the embankment functions as an emergency spillway apron to discharge storm water downstream from the basin. The embankment was constructed with 2 H to 1 V sideslopes and a crest width of approximately 19 feet. The inboard sideslope of the embankment is

approximately 14 feet high. The outboard side of the embankment is approximately 21 feet high.

- **Vegetated Drainage Corridor** - A vegetated area is located downstream of the spillway apron and the 42-inch CMP pipe outlets. The vegetated area is approximately 200 feet long by 50 to 100 feet wide and conveys storm water flows downstream to three CMP culvert outfalls beneath Farrington Highway.

Work Plan Activities

In order to restore the basin to its intended capacity and function, specific activities will be performed for the features described previously. These activities are described in more detail and are currently being implemented or will be implemented as soon as possible after the basin is dewatered.

- **Basin Pumping** - Prior to cleaning and inspection of the sedimentation basin features, all standing water will be pumped from the basin and discharged at a POTW designated by the City and County of Honolulu.

- **Basin Inlet Apron** - All sediment and debris on top of the energy dissipator and interior berm will be removed until the underlying riprap apron and berm armoring are exposed. Any riprap missing from this area will be replaced with 18-inch to 24-inch diameter rock. The riprap will consist of basalt material with good rock quality obtained from the on-site excavation activities within the landfill.

- **Northern Basin and Interior Berm Area** - The sediment and debris from the basin will be removed to restore the basin floor to the design elevation of El.65.0. Any sediment that collected against the toe or side slopes of the basin will be removed to restore the basin slopes to their design 2 H to 1V inclination and the basin floor width to the design dimensions shown in Attachment A. The riprap armoring on the interior berm and energy dissipation swales will be fully uncovered and inspected to determine if there are areas of dislodged or missing riprap. Any areas of missing riprap will be replaced. The riprap will consist of on-site material as described previously. After drying, sediment will be used for daily cover and debris will be disposed in the landfill.

- **Southern Basin Area** - The sediment and debris from the basin will be removed to restore the basin floor to the design elevation of El.65.0. Any sediment that collected against the toe or side slopes of the basin will be removed to restore the basin slopes to their design 2 H to 1V inclination and the basin floor width to the dimensions shown in Attachment A. After removing sediment from the basin floor the subdrain trenches will be located and the 6" washed sand layer on the basin floor covering the subdrain system should be replaced. The concrete inlet riser pipes and steel trash racks will be visually inspected for debris or sediment blockage. If blockages are observed, they will be removed from the risers and

trash racks. The 42-inch CMP outfall beneath the embankment will be visually inspected for debris or sediment blockage. All sediment and debris should be removed from the CMP outfall pipes. After drying, sediment will be used for daily cover and debris will be disposed in the landfill

- **Riprapped Embankment and Spillway** - As a result of the December 2010-January 2011 storm events, sediment may have accumulated against the grouted riprap on the inboard and outboard faces of the embankment and spillway area. Any accumulated sediment in these areas will be removed and disposed properly in the landfill. Disposal may include using the material for daily cover. The overflow spillway will also be visually inspected for signs of debris that is blocking the overflow weir or that has migrated on the downstream face of the weir. All debris in the spillway will be collected and deposited in the landfill.

- **Vegetated Drainage Corridor** - The area immediately downstream of 42-inch CMP pipe outfalls and riprap apron was protected in the past with rock riprap. The riprap was placed to allow for storm water discharge to dissipate and spread throughout the vegetated area before leaving the site. These riprap areas will be inspected, and any missing or dislodged riprap will be replaced. On-site rock material will be used as described previously. All debris that migrated into the drainage corridor will be removed and disposed in the landfill.

  There may be bare soils areas within the vegetated drainage corridor that require short term erosion protection measures. These areas will be protected by seeding with erosion resistant vegetation and placement of temporary erosion control matting where necessary. We note that surface soils in the vegetated drainage corridor will be disturbed in order to construct the stilling basin outlet for the Western Surface Water Drainage System. Longer term erosion control measures for the vegetated drainage corridor will be considered during construction of the stilling basin structure.

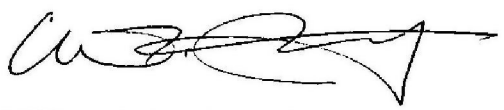
- **Sediment and Debris Disposal** - All sediment and debris removed from the areas described previously should be disposed in the landfill. Sediment will be stockpiled and allowed to dry. The dried sediment material can then be utilized as daily and intermediate cover during landfilling operations.

- **Implementation of Work Plan** - Waste Management will implement the work plan described using available site personnel and contractors. Inspection will be performed by AECOM engineers as required.

- **Documentation of Work Plan Activities** - Photo-documentation and field reports will be prepared by landfill personnel during and after restoration activities to support final reporting efforts of work plan implementation to the USEPA.

Schedule – Liquids are scheduled to be removed from the pond by February 14th provided there is no additional rainfall. After liquids are removed removing sediment, debris and silted-in underdrain material will occur. As soon as all material is removed from the pond, the underdrain will be reconstructed, other necessary repairs made and the pond put back into service. We anticipate removing the sediment and debris, and reconstructing the pond will take approximately 4 weeks and should be completed by March 14, provided we do not receive significant additional rainfall. If storm water enters the basin prior to the removal of the sediments, we would not discharge it as storm water, except in an emergency and only after consultation with the Hawaii Department of Health and the USEPA. The water will be removed and transported to a POTW designated by the City and County of Honolulu.

Very truly yours,
GEI Consultants, Inc.



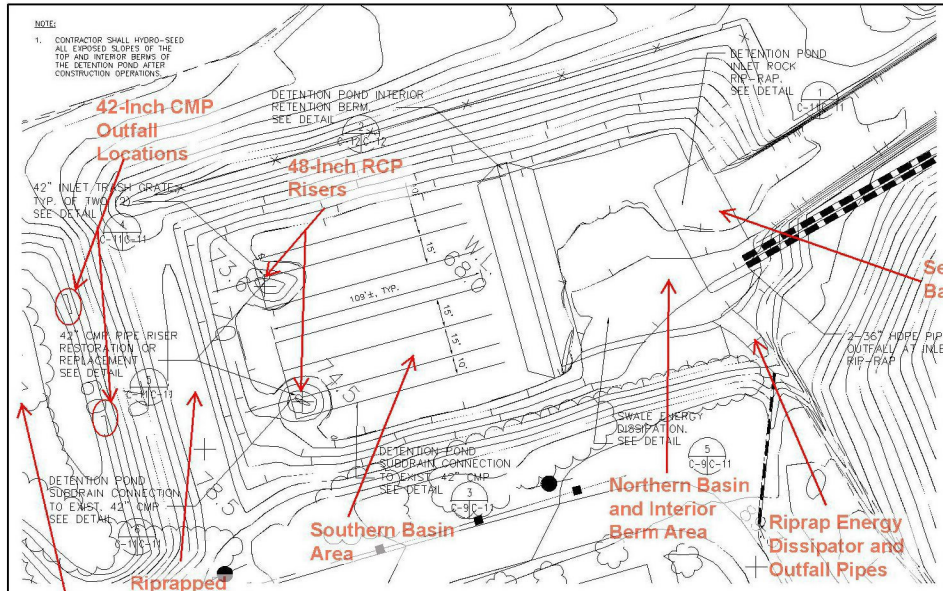
William A. Rettberg, P.E.
Vice President

Attachment A: Drawings by Shimabukuro, Endo, &Yoshizaki, Inc. and Earth Tech Depicting Basin Configuration and Features

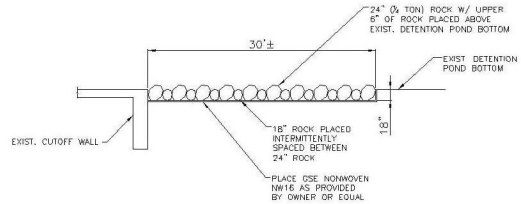
Attachment B: Photographs of the Sedimentation Basin Area in October 2007 After Construction of Modifications

ATTACHMENT A

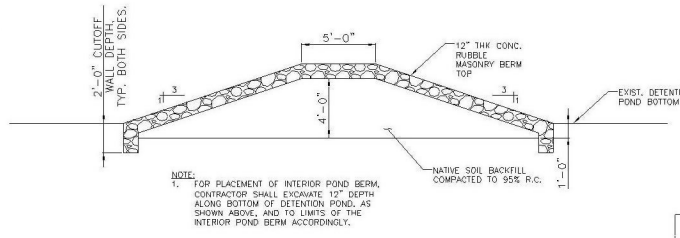
Drawings by Shimabukuro, Endo & Yoshizaki, Inc. and EarthTech Depicting Basin Configuration and Features



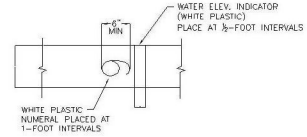
A DETENTION POND LAYOUT
C-12 SCALE: 1" = 30'



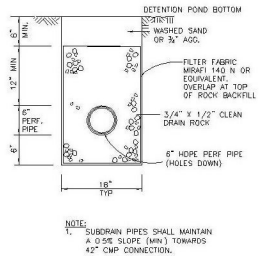
1 DETENTION POND INLET RIP-RAP
C-11 NO SCALE



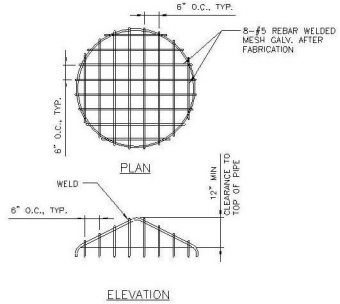
2 DETENTION POND BERM
C-11 NO SCALE



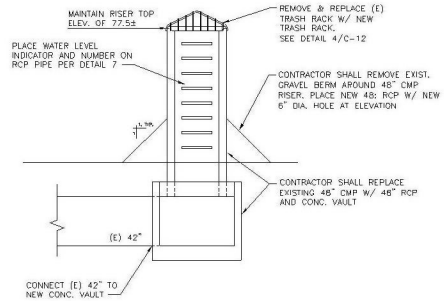
7 NUMBER DETAIL
C-11 NO SCALE



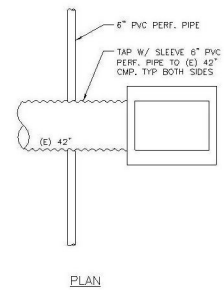
3 DETENTION POND SUBDRAIN DETAIL
C-11 NO SCALE



4 RISER GRATE
C-11 NO SCALE



5 REPLACEMENT OF (E) 42" RISER DETAIL
C-11 NO SCALE



6 6" SUBDRAIN TO 42" CMP CONNECTION DETAIL
C-11 NO SCALE

FINAL CONSTRUCTION PLANS

REV.	DATE	BRIEF	BY	APPROVED

JOB NUMBER 92382
FILE NO. 92382-C-11
DESIGNED: BWR DRAWN: RKH
CHECKED: REB APPROVED: –
SCALE: NO SCALE

BENJAMIN W. REALICO LICENSED PROFESSIONAL ENGINEER No. 11337-C HAWAII, U.S.A.

This work was prepared by me or under my supervision. ("Supervision of design" shall be as defined in Chapter 115, Hawaii Administrative Rules, Professional Engineers, Architects, Surveyors, and Landscape Architects, State of Hawaii, Subchapter 1 Section 16-115-2, Definitions effective June 30, 1994)

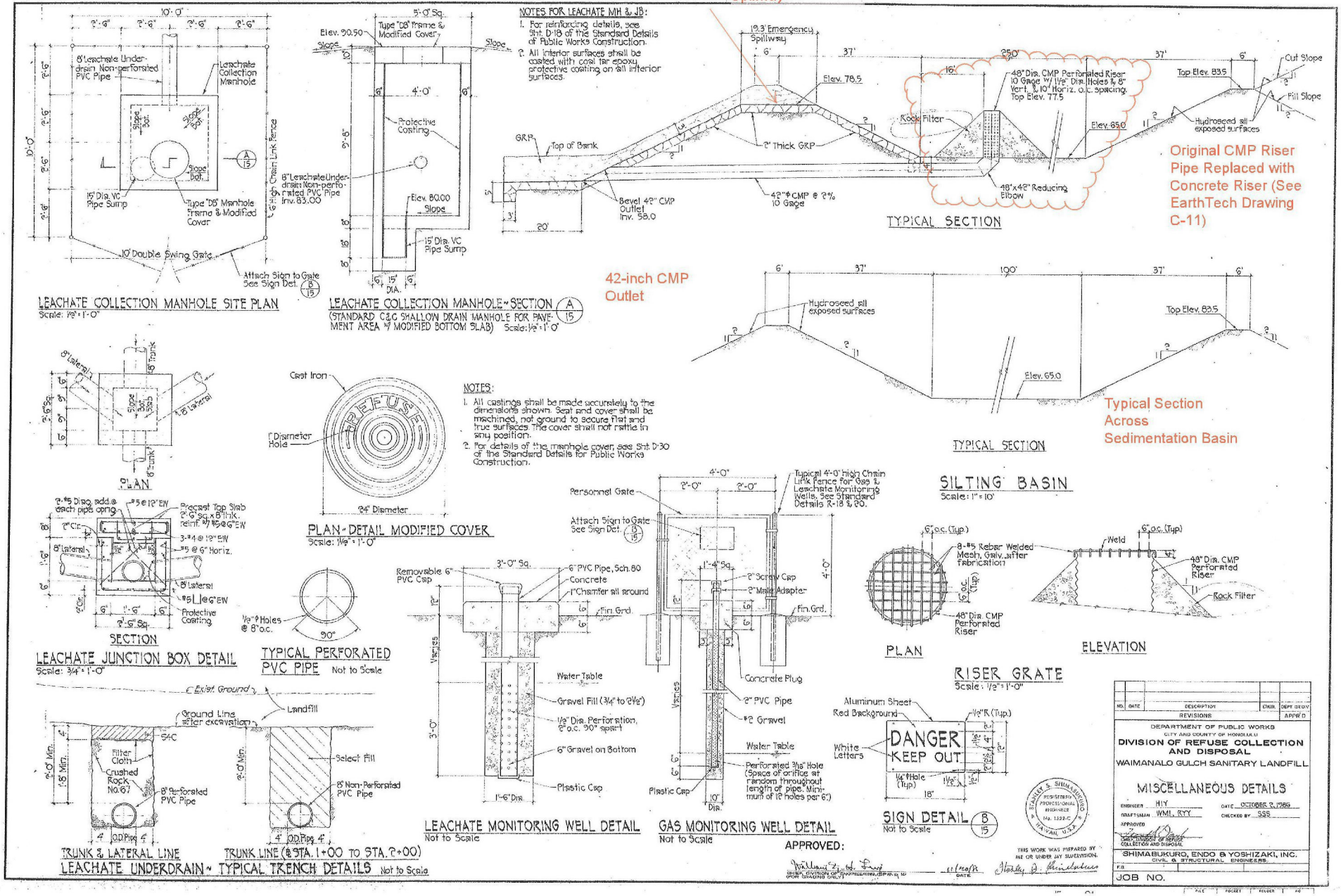
WASTE MANAGEMENT

PHASE 1 INTERIM ON-SITE DRAINAGE MEASURES PLANS

DETENTION POND DETAILS

DATE: 08/01/06
DRAWING NO. C-11
SHEET 14 OF 14

WMH001436

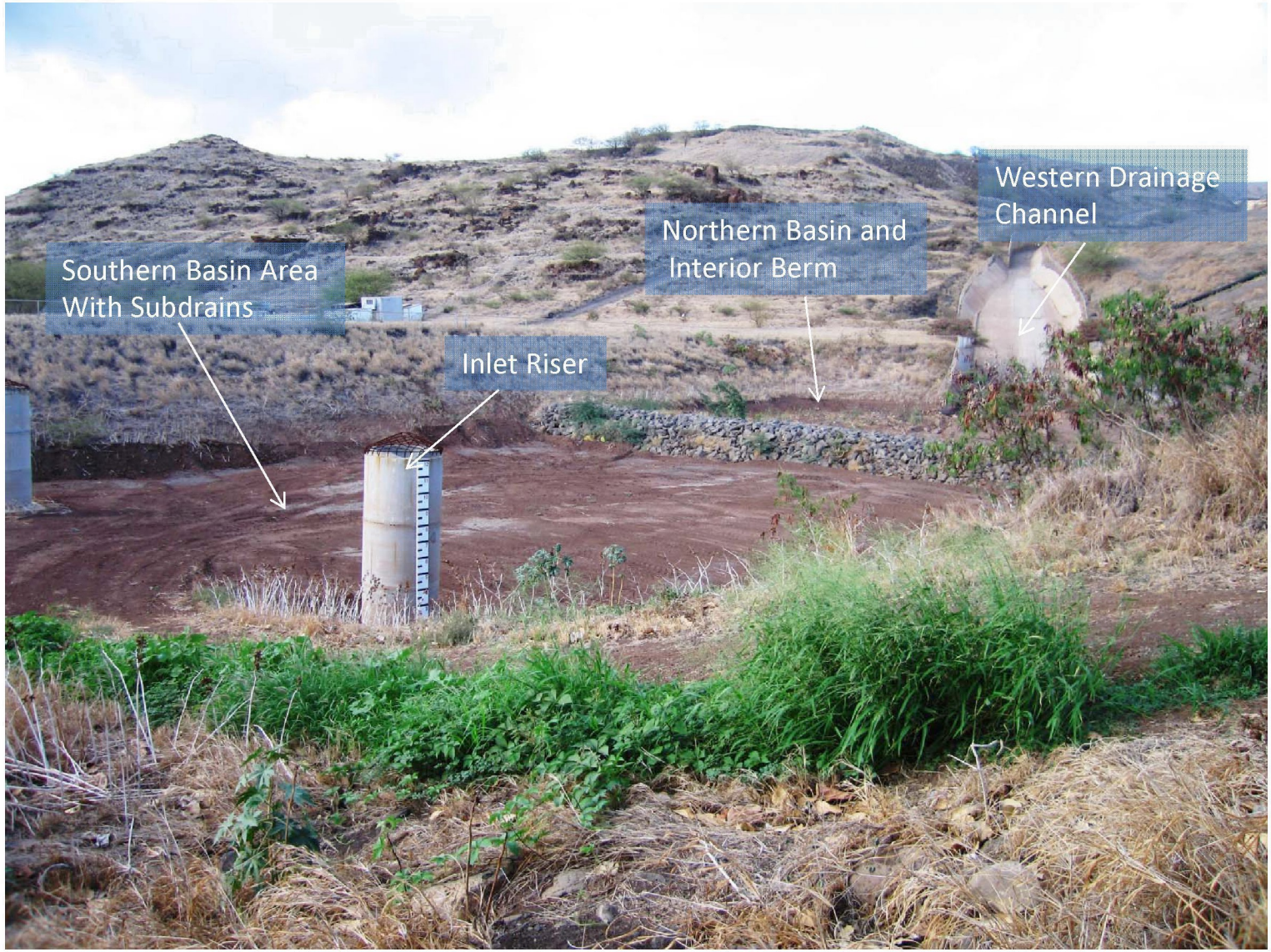

Riprapped Embankment and Spillway
Original CMP Riser Pipe Replaced with Concrete Riser (See EarthTech Drawing C-11)
42-inch CMP Outlet
Typical Section Across Sedimentation Basin
LEACHATE COLLECTION MANHOLE SITE PLAN
LEACHATE COLLECTION MANHOLE - SECTION (A/15)
(STANDARD C&C SHALLOW DRAIN MANHOLE FOR PAVEMENT AREA W/ MODIFIED BOTTOM SLAB)
NOTES FOR LEACHATE MH & JB:
1. For reinforcing details, see Std. D-18 of the Standard Details of Public Works Construction.
2. All interior surfaces shall be coated with coal tar epoxy protective coating on all interior surfaces.
TYPICAL SECTION
TYPICAL SECTION
PLAN
PLAN - DETAIL MODIFIED COVER
NOTES:
1. All castings shall be made accurately to the dimensions shown. Seat and cover shall be machined, not ground to secure flat and true surfaces. The cover shall not rattle in any position.
2. For details of the manhole cover, see Std. D-30 of the Standard Details for Public Works Construction.
SILTING BASIN
SECTION
LEACHATE JUNCTION BOX DETAIL
TYPICAL PERFORATED PVC PIPE Not to Scale
PLAN
ELEVATION
RISER GRATE
LEACHATE MONITORING WELL DETAIL
Not to Scale
GAS MONITORING WELL DETAIL
Not to Scale
SIGN DETAIL (B/15)
Not to Scale
TRUNK & LATERAL LINE LEACHATE UNDERDRAIN - TYPICAL TRENCH DETAILS Not to Scale
TRUNK LINE (@ STA. 1+00 TO STA. 2+00)
APPROVED:
DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
DIVISION OF REFUSE COLLECTION AND DISPOSAL
WAIMANALO GULCH SANITARY LANDFILL
MISCELLANEOUS DETAILS
SHIMABUKURO, ENDO & YOSHIZAKI, INC.
CIVIL & STRUCTURAL ENGINEERS
JOB NO.

WMH001437

ATTACHMENT B

Photographs of Sedimentation Basin Area in October 2007 After Construction of Modifications

View of Basin Looking South Along the Western Concrete-Lined Drainage Channel



View of Sedimentation Basin Looking North

WMH001440

View along Riprapped Embankment Crest Looking West

WMH001441

View of Basin Looking Northeast from Riprapped Embankment Crest